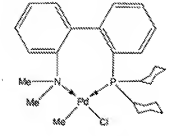
Amendment to the Claims

This listing of claims will replace all prior versions and listing of claims in this application.

Listing of Claims

1. to 40. (Cancelled)

41. (Withdrawn-Currently Amended) The catalyst system of claim [[1]] 43, wherein the catalyst precursor has the formula:



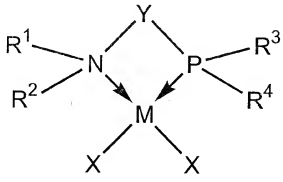
Formula XXIII

42. (Cancelled)

43. (New) An olefin polymerization or oligomerization catalyst system comprising the reaction product of:

(a) an activator selected from the group consisting of alumoxane, aluminum alkyl, alkyl aluminum halide, alkylaluminum alkoxide, discrete ionic activator, and Lewis acid; and

(b) a catalyst precursor having the following formula:



wherein:

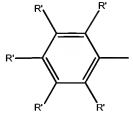
(i) M is Ni, Fe, Co, Pd, or Pt;

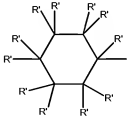
(ii) N is nitrogen and is bonded to M;

(iii) P is phosphorus and is bonded to M;

(iv) R^1 and R^2 are independently selected from the group consisting of methyl, ethyl, propyl, butyl, pentyl, hexyl, heptyl, octyl, nonyl, decyl, undecyl dodecyl, cyclobutyl, cyclohexyl, phenyl, benzyl, phenethyl, tolyl, cyclopentyl, cycloheptyl, cyclooctyl, cyclononyl, cyclodecyl, and cyclododecyl;

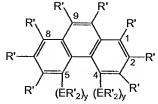
(v) R^3 and R^4 are independently selected from the group consisting of methyl, ethyl, propyl, butyl, pentyl, hexyl, heptyl, octyl, nonyl, decyl, undecyl dodecyl, cyclobutyl, cyclohexyl, phenyl, benzyl, phenethyl, tolyl, cyclopentyl, cycloheptyl, cyclooctyl, cyclononyl, cyclodecyl, cyclododecyl and substituents represented by the formulas:

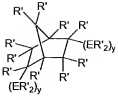


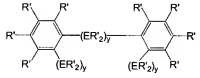


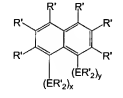
where R' are independently, hydrogen or C_1-C_{50} hydrocarbyl radicals, and any two adjacent R' may independently be joined to form a saturated or unsaturated cyclic structure;

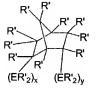
(vi) Y is butenyl or has one of the following formulas:

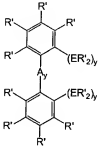


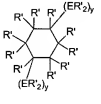


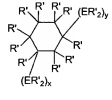


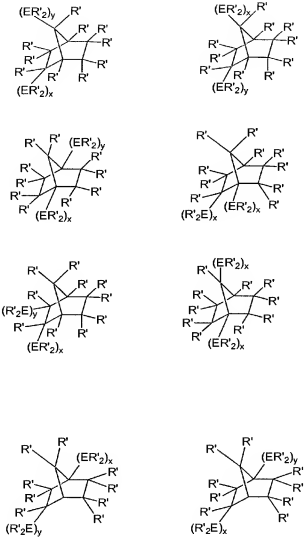












where:

(a) R' are independently hydrogen or C_1-C_{50} hydrocarbyl radicals;

(b) A is a non-hydrocarbon atom functional group;

(c) E is a Group-14 element;

(d) x is an integer from 1 to 4; and

(e) y is an integer from 0 to 4; and

(vii) X are independently selected from the group consisting of chloride, bromide, iodide, methyl, ethyl, propyl, butyl, pentyl, hexyl, heptyl, octyl, nonyl, decyl, undecyl, dodecyl, methoxide, ethoxide, dimethylamide, diethylethoxide, and

phenoxide,

wherein the olefin polymerization or oligomerization catalyst system exhibits an activity that exceeds 8000 moles of ethylene per mole of M per hour.

44. (New) The catalyst system of claim 43, wherein R^3 and R^4 are selected from the group consisting of cyclohexyl, phenyl, benzyl, phenethyl, and tolyl.

45. (New) The catalyst system of claim 43, wherein R^1, R^2, R^3, and R^4 are independently selected from the group consisting of methyl, ethyl, propyl, butyl, cyclohexyl, phenyl, tolyl, benzyl, and phenethyl.

46. (New) The catalyst system of claim 43, wherein A is selected from the group consisting of C=O, C=S, O, S, SO_2, NR*, PR*, BR*, $SiR*_2$, and $GeR*_2$, where R* is independently a hydrocarbyl or halocarbyl radical.

47. (New) The catalyst system of claim 43, wherein Y is biphenyl.

48. (New) The catalyst system of claim 43, wherein X are independently chloride, bromide, iodide, methoxide, ethoxide, dimethylamide, diethylethoxide, or phenoxide.

49. (New) The catalyst system of claim 43, wherein the activator comprises $B(C_6F_5)_3$ or $B(C_6H_5)_3$.

50. (New) The catalyst system of claim 43, wherein the activator comprises a cyclic oligomeric aluminum compound represented by the formula $(R"\text{-}Al\text{-}O)_n$, or a linear oligomeric aluminum compound represented by the formula $R"(R"\text{-}Al\text{-}O)_nAlR"_2$, wherein R" is independently a C_1-C_{20} alkyl radical, and wherein n is an integer from 1-50.

51. (New) The catalyst system of claim 43, wherein the activator is methylalumoxane.

52. (New) The catalyst system of claim 43, wherein the activator is triethylaluminum, diethylaluminum chloride, triisobutylaluminum, tri-n-octylaluminum, or a combination thereof.

53. (New) The catalyst system of claim 43, wherein the activator is $[Me_2PhNH][B(C_6F_5)_4]$, $[Bu_3NH][BF_4]$, $[NH_4][PF_6]$, $[NH_4][SbF_6]$, $[NH_4][AsF_6]$, $[NH_4][B(C_6H_5)_4]$, $B(C_6F_5)_3$, $B(C_6H_5)_3$, or a combination thereof.

54. (New) The catalyst system of claim 43, wherein the catalyst is deposited on a solid support, the solid support comprising polymeric materials or refractory oxide materials.

55. (New) A catalyst system comprising the reaction product of
(a) the catalyst system of claim 43 and
(b) olefin monomer(s) comprising ethylene, propylene, 1-butene, or a mixture of any two or all three of ethylene, propylene, and 1-butene.

56. (New) The catalyst system of claim 43, further comprising at least one additional olefin polymerization catalyst.

57. (New-Withdrawn) An oligomerization or polymerization method comprising contacting at least one catalyst system of claim 43 with alpha-olefin comprising ethylene, wherein the catalyst's activity exceeds 8000 moles of ethylene per mole of M per hour.

58. (New-Withdrawn) The method of claim 57, further comprising recovering a product comprising greater than 50 mol% of linear C_4-C_{14} alpha-olefins based on the total weight of polymerized product.

59. (New-Withdrawn) The method of claim 57, wherein the product comprises greater than 80 mol% of linear C_4-C_{14} alpha-olefins.

60. (New-Withdrawn) The method of claim 57, wherein the product comprises greater than 50 mol% of linear C_4 and C_6 alpha-olefins.

61. (New-Withdrawn) The method of claim 57, wherein the product comprises greater than 80 mol% of linear C_4 and C_6 alpha-olefins.

62. (New-Withdrawn) The method of claim 57, comprising reacting
(a) the catalyst system and
(b) olefin monomer(s) comprising ethylene, propylene, 1-butene, or a mixture of any two or all three of ethylene, propylene, and 1-butene.

63. (New-Withdrawn) The method of claim 57, wherein the oligomerization or polymerization is run in the presence of an aprotic organic liquid.

64. (New) The catalyst system of claim 43, further comprising an aprotic organic liquid.

65. (New) The catalyst system of claim 55, wherein the olefin monomer(s) consists essentially of ethylene, propylene, 1-butene, and mixtures thereof.

66. (New) The method of claim 62, wherein the catalyst system is reacted with olefin monomer(s) consisting essentially of ethylene, propylene, 1-butene, and mixtures thereof.